# A critical appraisal of "The Effects of Visual and Auditory Cues on Freezing of Gait in Patients with Parkinson Disease"

**By**

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**Abstract**

The purpose of this paper is to critically appraise a research study that was published by the American Journal of Physical Medicine & Rehabilitation. This research article was conducted in order to compare the effects of visual and auditory cues on the gait pattern of individuals with Parkinson's Disease and freezing of gait. This article was analyzed to answer the clinical question: Are visual cues or auditory cues more successful in improving the gait pattern of a patient with Parkinson's Disease who is experiencing freezing of gait? The conclusion of this paper is that the article has provided sufficient enough information to prove that visual cues are more effective in improving the gait pattern of subjects with Parkinson's Disease and freezing of gait .

**Key words: Parkinson's Disease, Visual, Auditory, Cues**

## Introduction

Parkinson's Disease is affects over 200,000 people per year and has many disabling effects. One of the most complex symptoms that is seen in the advanced stages of Parkinson's Disease is freezing of gait. Freezing of gait is best explained as events in which the individual is unable to generate effective steps and stays in one place. Although there is not enough information to determine the exact cause of this, many clinicians have looked for ways to overcome the episodes of freezing of gait. The use of visual and auditory cues is one of the most common interventions because of their effectiveness and convenience. An individual can carry a portable laser pointer or music player in order to provide visual or auditory cues in their everyday life. It is important for physical therapists to find which type of cues work best for overcoming freezing of gait, because they have limited amounts of time to work with patients. My clinical question is: Are visual cues or auditory cues more successful in improving the gait pattern of a patient with Parkinson's Disease who is experiencing freezing of gait?

## Methods

When finding articles for my research question, I used the U-Search engine on Angelo State's website and selected the CINAHL database. The search terms included "Freezing of gait" and "Visual cues" and "Auditory cues". The limits that I placed on this search included peer-reviewed journals, publishing date of 2008 or after, and randomized controlled trial research designs. I did this, because I wanted to see credible articles that used the newest interventions and analysis technology and also focused on my research question. I looked for articles that chose populations including both men and women and excluded articles that involved other variables (type of terrain, use of medication) in addition to the use of cues. When searching with

the previously mentioned criteria, I found 20 hits using the CINAHL database before I began to review the articles.

This article is about a research study that was conducted in Seoul, Korea by Sook Joung Lee, MD, Jong Yoon Yoo, MD PhD, Ju Seok Ryu MD, Hee Kyoung Park, MD and Ju Chung MD,PhD. The article was published in the American Journal of Physical Medicine & Rehabilitation in 2012. This research article is about a study that focuses on the effects of visual and auditory cues on the gait patterns of Parkinson's Disease patients with freezing of gait, Parkinson's Disease patients without freezing of gait, and healthy volunteers. I chose this research study for a comprehensive critical appraisal because it directly compares the influence of auditory cues to visual cues on the gait of an individual with freezing of gait. The gait analysis was also very detailed in that it included both visuospatial and kinematic parameters which helped to further explain why visual cues worked better for a patient who only had Parkinson's disease. The thirty-five participants were allocated into groups (Parkinson's Disease with freezing of gait, Parkinson's Disease without freezing of gait, and healthy volunteers) based on their medical history, questionnaire answers, and their score on the Unified Parkinson's Disease Rating scale. Each group was asked to complete the same task of walking a 7-meter pathway and back with no cues, visual cues, and then auditory cues while completing the gait cycle.

**Results**

Summary of the study

This research article includes a quasi-experimental study that evaluates the influence of visual and auditory cues on the gait of Parkinson's Disease patients who suffer from freezing of gait. This research was conducted with three different groups including: Parkinson's disease with freezing of gait, Parkinson's disease without freezing of gait, and healthy volunteers. Each

individual was given the same interventions in which they were asked to complete a "gait cycle" consisting of a 7-meter pathway and back. The pathway was presented in three different conditions: no cues (baseline), with white stripes on the floor (visual cue), and with a metronome (auditory cue). The data for this study was collected by using a computerized motion analyzer which compared the visuospatial parameters (velocity, cadence) and kinematic parameters (pelvic tilt, hip flexion) of each gait cycle. The results of this experiment showed more improvement in gait of subjects with Parkinson's Disease and freezing of gait when using visual cues over auditory cues. Additionally, the use of auditory cues showed more improvement in the gait patterns of patients with Parkinson's Disease who did not have freezing of gait.

Appraisal of the study introduction

The introduction was very clear in stating that the goal of the study was to determine the effects of visual and auditory cues on Parkinson's Disease patients with freezing of gait. The authors went on to explain the importance of this research and how this specific experiment had never actually been conducted before. A weakness that was found in the introduction of this article was the literature review, because the author did not include many sources or go into enough detail about the findings of similar studies that were referenced in the introduction. As a result of this, the research study did not have a strong foundation of knowledge to build from.

Appraisal of the study methods

This research study followed a quasi-experimental design that was cross-sectional and single-blinded. Thirty-five subjects were recruited and split into three different groups based on their signs, symptoms, and questionnaire scores. This was a within-subject research design, because each person's performance and measurements in one gait cycle was compared to their performance in another. Each group received the same instructions, interventions, and methods

of collecting data. The authors explained that the individuals completed the gait cycles during the "off phase" of their medication in order to get a true examination of the effect of cues. The interventions were described clearly, however, the instruction of what types of clothes or shoes to wear was left out of the text. One of the pictures that was presented in the article showed an individual without shoes on, which can be crucial to the gait pattern of the individual. Another weakness that I found in the methods of this article was that the process of data collection was not clearly written. The authors explained that they used a three-dimensional computerized motion analyzer and which measurements would be collected but failed to explain how this device actually collected the information.

Appraisal of the study results

The results section of this article was well written and answers the questions that were proposed in the introduction. The participants were asked to complete a Unified Parkinson's Disease Rating Scale questionnaire which was presented in a chart along with their sociodemographic information. The visuospatial and kinematic measures for the Parkinson's Disease with freezing of gait and Parkinson's Disease group without freezing of gait were displayed in a chart as well as a set of bar graphs to directly compare each measurement in the three different scenarios. The authors explained that the significant findings of this research included: visual cues showed significant improvement in aspects of gaits (including decreased freezing of gait) in Parkinson's Disease patients with freezing of gait, auditory cues showed improvement in the aspects of gait in Parkinson's Disease patients without freezing of gait. The authors took into account that each group had different baseline measure and compared the difference ratios of each group in the three different scenarios in order to accurately compare improvement or deterioration in each scenario. One weakness that I did find in the results section

was the orientation of the bar graphs, as their order did not follow the same order as what was presented in the chart.

Appraisal of the study discussion

The authors went into further detail about the findings that were presented in their results. They clearly explained the difference in visuospatial and kinematic measures found among the three different scenarios for each group and how these changes either improved or worsened the subject's overall gait pattern. For example, the authors explain that the use of auditory cues showed the greatest improvement on the gait of Parkinson's Disease patients without freezing of gait, because of their difference ratio of both ankle dorsiflexion and knee flexion. A weakness that I recognized in the discussion of this article was the authors' references to previous literature, because they did not give a lot of detail about the conclusions of other research studies. Additionally, they compared their results to another research study that analyzed patients during the "on" phase of their medication, so this was not the best comparison when trying to find supporting information on influence of visual and auditory cues.

**Discussion**

This research study helped to prove that one cue was more effective than the other when helping a patient to overcome freezing of gait. It is extremely important to know which interventions are most effective in treating or managing a patient's symptoms so that they are able to improve their abilities in an efficient way. Physical therapists are only allowed so many therapy sessions with their patients at a time, therefore, the faster the PT can find an effective intervention, the faster they can set goals to reach for and see improvements. This research study directly answers my clinical question of whether visual or auditory cues are a more effective

intervention for freezing of gait because the results showed better improvements in gait patterns with the use of visual cues.

The use of visual and auditory cues as an intervention for freezing of gait is very beneficial to the Parkinson's Disease population. The cues have shown to improve the gait patterns of both patients with freezing of gait and without freezing of gait and are safe to use; however, the patient should be advised to pay attention to their surrounding environment when employing these cues in everyday life. The patient should know the potential hazard of missing environmental information when focusing on visual or auditory cues. I believe that the benefits of visual and auditory cues outweigh the possible risk, because they ultimately help the individual to move more efficiently and safely. The authors explained that the use of visual cues helped to improve the gait pattern of those with freezing of gait more than the use of auditory cues did. The authors stated that a possible reason for the auditory cues not working could be that the subjects were unable to hear the cues.

The findings of this research study directly relate to patients who have Parkinson's Disease and struggle with freezing of gait. Freezing of gait can occur multiple times a day, greatly influencing one's ability to complete daily tasks and maintain a social life. Therefore, it is necessary to find a proper intervention that can reduce the frequency and duration of these episodes. I have enough confidence in the information that was presented in this journal to consider using this intervention with future patients, because the overall change in gait when using the cues showed to improve. The results section of this article successfully presented information that showed large improvement gait when using visual cues and moderate improvement when using auditory cues. The use of these cues is a great example of a low risk intervention that can be tested in a clinical setting and carried into everyday life.

This research article overall was well written and clear about stating the purpose and findings of the study. However, two weak points that were found in this article included the unclear description of how data was collected with the motion analyzer and a weak literature analysis. The authors failed to include detail in the methods section when explaining how the device collected data, and only stated where markers were attached to the body and what measurements were taken. In addition to this, the authors could have included more sources or further explained the findings of similar studies to help the readers understand the established information about this intervention.